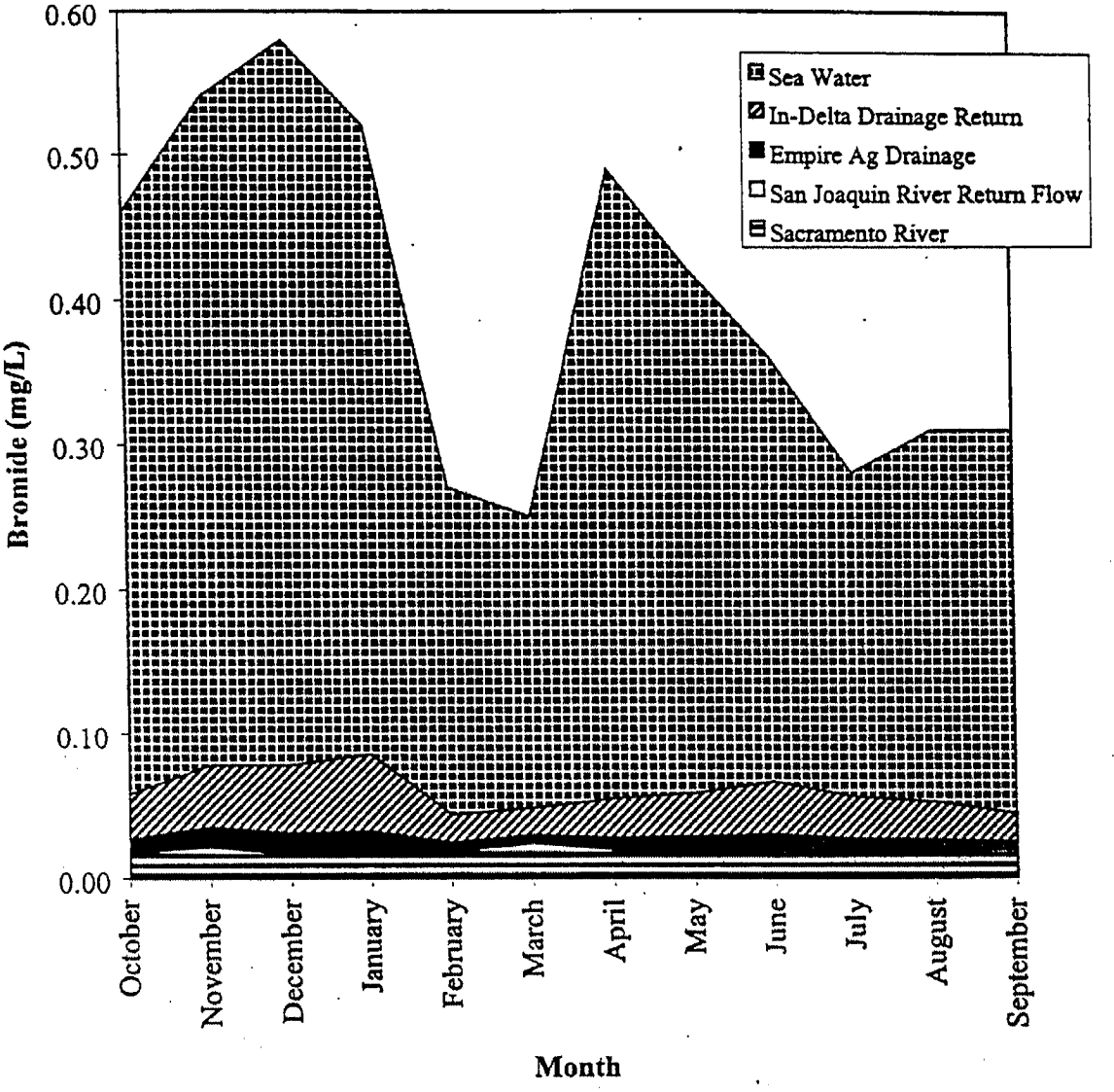
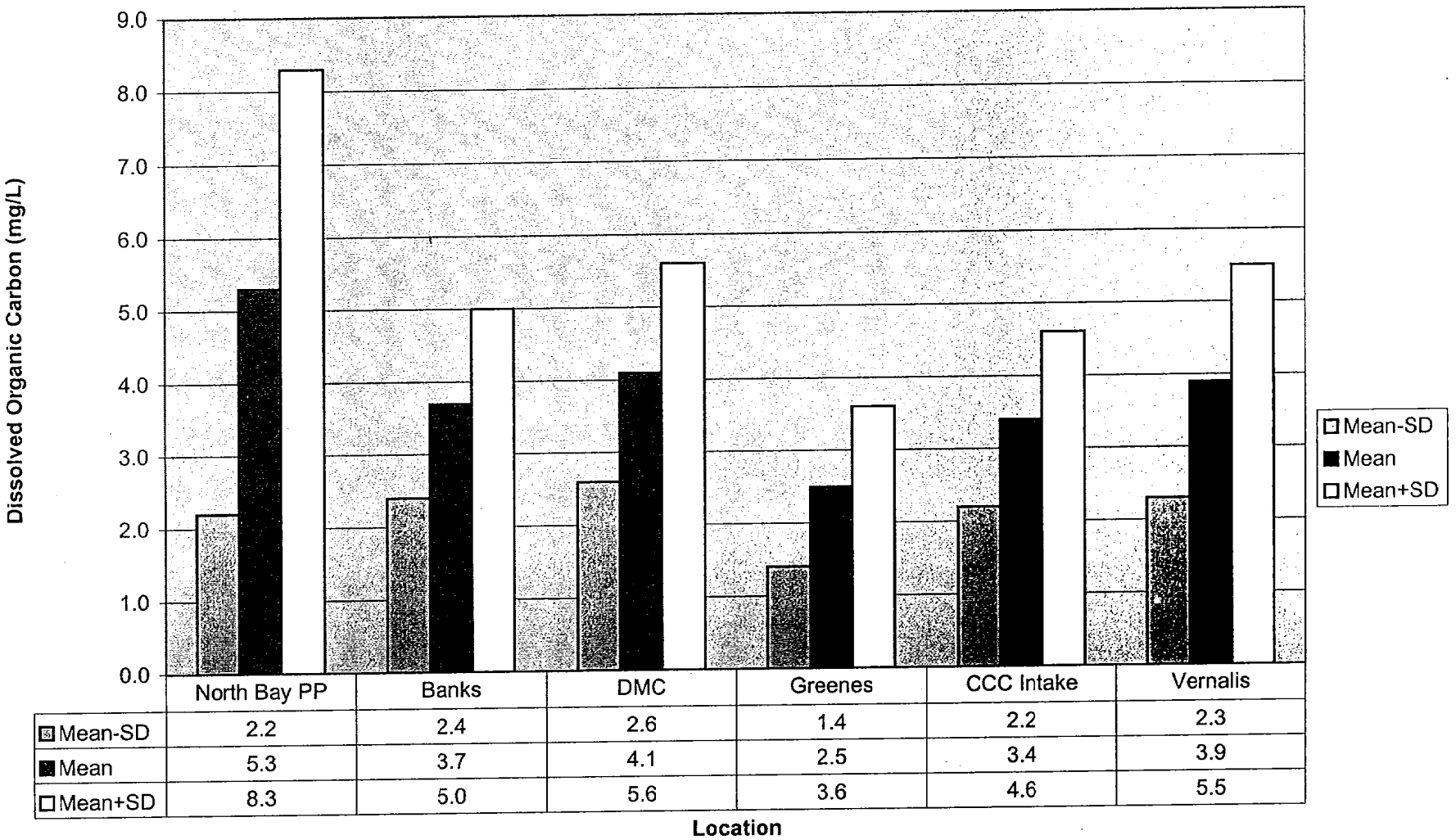


Source: Metropolitan Water District of Southern California. Based on bromide samples collected in calendar year 1990.

Figure 10. Possible Contribution of Bromide at Banks Pumping Plant from Several Sources



	North Bay PP	Banks	DMC	Greenes	CCC Intake	Vernalis
Mean-SD	2.2	2.4	2.6	1.4	2.2	2.3
Mean	5.3	3.7	4.1	2.5	3.4	3.9
Mean+SD	8.3	5.0	5.6	3.6	4.6	5.5

Figure 11. Organic Carbon at Selected Delta Locations

Estimated Organic Carbon Concentrations in Water Exported from the Delta through Banks Pumping Plant Associated with the CALFED Program Alternatives

Alternative	Median Organic Carbon (mg/l)	90th Percentile Organic Carbon (mg/l)
No Action	3.2	3.8
1	3.1	3.6
2	3.1	3.7
3	2.5	2.9

Notes: The median organic concentrations can be achieved half of the time, while the 90th percentile numbers represent the organic carbon concentrations that would be achieved 90% of the time.

DWR estimated that drainage from Delta islands during April through August contributed 40–45% of the organic carbon fraction with the capacity to form DBPs in Delta source waters. The estimate for the November through February drainage period was 38–52%. (The estimate was based on water year 1988.) While this estimate can be in error to some degree, it indicates that drainage from Delta islands may be responsible for most of the increase that is seen as water flows through the Delta. Control of organic carbon at the source would, therefore, seem to offer the theoretical prospect of producing results similar to construction of a new canal, with respect to organic carbon.

Control of organic carbon at the source would seem to offer the theoretical prospect of producing results similar to construction of a new canal, with respect to organic carbon.

DWR has undertaken a preliminary evaluation of the feasibility of treating Delta island drainage for organic carbon removal. This evaluation indicates that removal of about 60% of the organic carbon in island drainage through conventional processes may be technically feasible. Although fairly costly, such treatment could perhaps prove to be economically feasible, depending on the comparative cost of addressing the problem in other ways.

In its recent report, CUWA concluded that attaining a 3.0-mg/l or better organic carbon concentration in source waters from the Delta is a desirable objective for enabling current and prospective drinking water standards to be met, assuming that a bromide goal of 50 μg/l also could be met. Although it is probably not practical to treat all Delta drainage for organic carbon removal, it appears theoretically possible to use island drainage treatment to a degree sufficient to meet the CUWA objective independent of the selection of storage and conveyance alternatives. Because the results of the preliminary treatment study have not been verified with pilot-scale testing and feasibility and because adequate cost analyses

have not been completed, it would be premature to conclude that this option is workable. Also, treatment to remove organic carbon would not affect bromide.

This approach may not be practical if CALFED actions to restore the aquatic ecosystem result in new inputs of organic carbon to the system. Treatment options and the TOC consequences of ecosystem restoration actions are topics for further study.

3.7.3 Conclusions

Based on this preliminary analysis, it appears unlikely that Water Quality Program actions, short of drainage treatment, can be expected to greatly reduce bromide or organic carbon concentrations in drinking water supplies from the Delta. Both organic carbon and bromide might be subject to control by drainage treatment if the technology can be proven and if it can be made economically feasible. These conclusions must, however, be proven through further detailed analysis.

Based on this preliminary analysis, it appears unlikely that Water Quality Program actions, short of drainage treatment, can be expected to greatly reduce bromide or organic carbon concentrations in drinking water supplies from the Delta.

3.7.4 Recommendations

The above analyses of bromide and organic carbon sources suggest the following recommendations for further study and action in the first stage of program implementation:

1. Perform a more thorough evaluation of sources of bromide in the San Joaquin River, including:

   (a) "Fingerprinting" sources, using water quality characteristics such as ionic and isotopic ratios.

   (b) Determining the fate and transport of methyl bromide in the San Joaquin Valley as related to conversion to bromide and mobility into the San Joaquin River system.

2. Further evaluate the causes of increased bromide in San Luis Reservoir by quantifying the effects of evaporation and timing of reservoir filling. Also, determine whether a significant unidentified source of bromide exists.

3. Quantify the importance of connate groundwater on Empire Tract and adjacent islands. Additional sampling and analysis may be required.

4. Conduct inter-laboratory comparative studies to demonstrate that DWR, SCVWD, MWD, Lawrence Berkeley Laboratory, and other laboratories performing bromide analyses of Delta water are able to produce comparable data.

5. Perform further feasibility evaluations for treating Delta island drainage to remove TOC and, if favorable, initiate a pilot-scale field evaluation of treatment feasibility. (Refer to earlier discussion on page 3-14.)

6. Perform pilot studies to determine the feasibility of managing or relocating island drains to reduce TOC and the pathogen impacts on drinking water intakes. (Refer to earlier discussions on page 3-14.)

7. Track public health effects studies to more specifically identify the potential health effects of bromide-related DBPs.

8. Investigate alternative sources of high-quality water supply for urban users of Delta water. Capture more drinking water during periods of high Delta water quality.

9. Evaluate alternative approaches to drinking water treatment, to address growing concerns over DBPs and salinity. Approaches to include technologies for the removal of pathogens from urban water supplies.

10. Investigate combinations of new supplies, operational changes, and technological changes that can minimize salt content of urban drinking water supplies and provide continuously greater public health protection.

11. Convene an expert panel in a public forum to make recommendations to the governing entity regarding solutions to identified public health issues for urban users of Delta water.

12. Develop a plan sufficient to meet forthcoming EPA and DHS standards for brominated and chlorinated DBPs.

13. Support the ongoing efforts of the Delta Drinking Water Council and its technical work groups. Specific actions include:

    - The Council will complete its initial assessment of progress toward meeting CALFED water quality targets and alternative treatment technologies by the end of 2003.

    - The Council will complete its final assessment and submit final recommendations on progress toward meeting CALFED water

quality targets and alternative treatment technologies by the end of 2007.

14. Reduce contaminants and salinity that impair Delta water quality.

15. Enable voluntary exchanges or purchases of high-quality source waters for drinking water uses.

Undertaking these actions in the first stage of CALFED Program implementation will develop the information necessary to institute prevention and control activities but will not result in immediate water quality improvement.

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